

Wildlife Populations: American Shad

Background

The American shad, *Alosa sapidissima*, is the largest member of the herring family and is a native species of New Jersey's coastal waters. It is an anadromous fish, which means it spends most of its life at sea and returns to freshwater streams to breed. Non-spawning adults are found in schools near the surface of continental shelf waters and brackish waters in the spring, summer, and fall. Newly hatched larvae are found in rivers during the summer; by autumn they enter the sea and remain there until maturity. Shad feed on plankton and sometimes small fish, and are caught in rivers and estuaries during their spawning migration. The roe is highly prized as a food item, and the fish also can be eaten pan-fried, broiled and baked.¹ There are distinct populations of shad along the Atlantic Coast from Newfoundland to the St. Johns River in Florida.

In New Jersey, the principal area used by shad for spawning and nursery purposes is the Delaware River, extending from Lambertville, New Jersey upstream into the east and west branches of the Delaware River in New York.² The onset of the annual shad migration in the spring is celebrated in a number of ways. A common understory tree, the juneberry, or serviceberry, also is called shadbush in the East because its flowers bloom at the same time that shad swim upstream to spawn. The Shad Fest, an annual event in Lambertville, is a popular town-wide festival featuring entertainment, special events, and shad cooked in a variety of styles.³

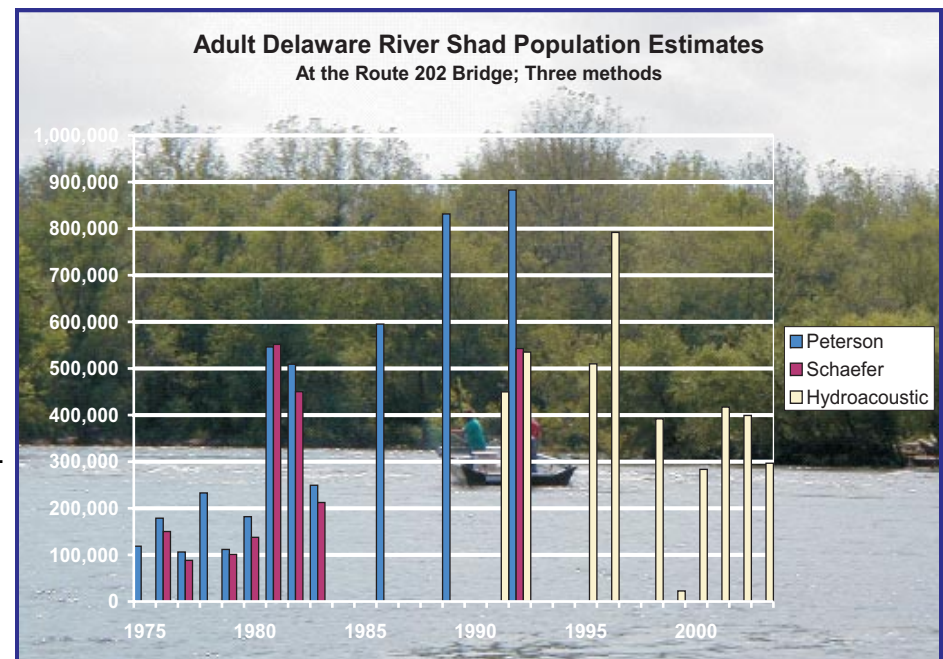
Trend

In the late 1890s, the Delaware River had the largest annual commercial catches of any river on the Atlantic Coast, estimated to range from 9 to 19 million pounds. However, the American shad catch began to decline rapidly in the early 1900s. This decline continued well into the 1930s with a slight recovery in the 1940s, but shad catches remained low throughout the 1970s.

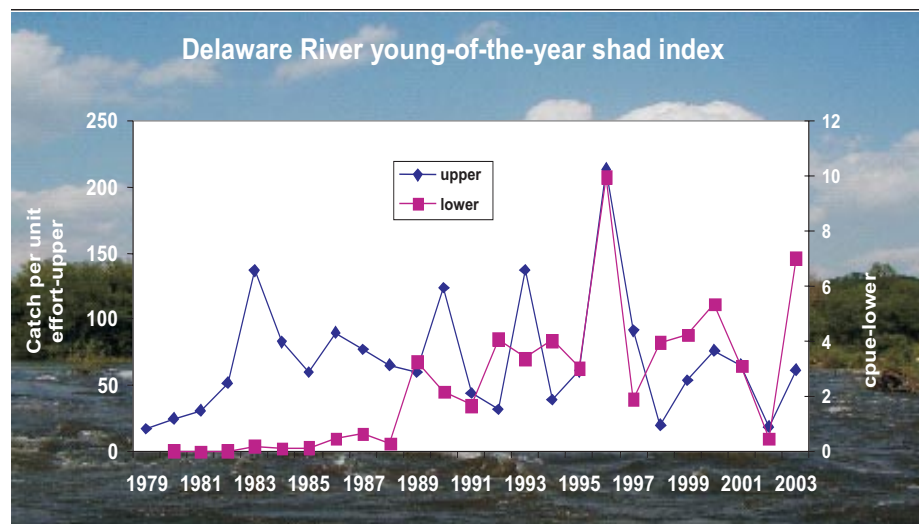
Studies have recognized water pollution, dams on major tributary streams, introduction of exotic fishes, and overfishing as probable causes of the decline. The principal factor affecting shad in the Delaware River was probably water pollution because by the middle of the 20th century the Delaware had become so polluted the oxygen levels in the

region of Camden and Philadelphia were too low for migrating shad to survive. Since the passage of the Federal Clean Water Act of 1972 and the resulting wide-scale implementation of municipal wastewater treatment in the region, much of the pollution in the lower river, near Philadelphia, has abated. The elimination of this "pollution block" of low or no dissolved oxygen has enabled more adult shad to migrate upstream to spawn. Additionally, it allowed more adult and juvenile shad to return to the Atlantic Ocean after spawning. Today, the Delaware supports a valuable commercial and sport shad fishery.⁴

Although shad have returned to the middle and upper Delaware, it is difficult to measure precisely the recovery of this species. A variety of methods have been used to estimate the population of this fish in the Delaware; where different methods have been used in the same time period, results have not always been consistent. Most recently, a technique called hydroacoustics, which uses sound waves to measure the number of shad moving upstream, has been used to provide information on fish size, location and abundance.



Another method used to track shad populations involves collection of juvenile fish with haul seine nets at specific sites in both the upper Delaware River (the stretch from Trenton to Milford, Pa.) and the lower Delaware (the stretch from below Trenton to the Delaware Bay). The fish are collected in August, September and October, and the average number of juvenile shad collected per netting (catch per unit effort) is determined. That number is converted to the geometric mean for each year. These data show the recovery of the population in the 1970s and 1980s, and the apparently stable, albeit variable, populations of recent years. (See “Delaware River young-of-the-year shad index”).



Outlook and Implications

As the figures show, there is great variability in the upper and lower Delaware River populations from year to year, and the high adult populations recorded from the late 1980s and in 1996 at the Route 202 bridge have not been repeated since on the upper Delaware. However, because shad spend most of their lives at sea where they are subject to a number of different environmental conditions, decreasing populations in the Delaware River are not necessarily attributable to declining conditions in the Delaware. There is some belief that the improving environmental conditions in and around Philadelphia, which is the shad's traditional spawning grounds, are allowing the fish to spawn further south of the sampling site. However, there are no plans to move the adult shad sampling site because the river in the regions of the traditional spawning sites is too wide to effectively apply the hydroacoustic method.⁵ It is also possible that shad are suffering increased predation from the striped bass, *Morone saxatilis*, whose populations in the Delaware River and estuary have rebounded dramatically in recent years.⁶ Continued and consistent monitoring at the Delaware River sites is important.

Many watersheds throughout the state now have dramatically improved water quality, and may have the potential to support a spawning population of American shad. For example, the Raritan River historically supported a spawning run of American shad, so in the early 1980s adult male and gravid (egg-bearing) female Delaware River American shad were stocked there in an attempt to reestablish a spawning run. A dam constructed at the confluence of the Millstone and Raritan rivers is equipped with a fish ladder that includes an underwater viewing room. A video camera has revealed increasing numbers of adult shad during the eight years that the fish ladder has been in operation. There also have been reported angler catches of American shad in the Raritan River as well as the Passaic River and Rancocas Creek. Investigation of these and other waterways will be essential to the management of this species. If shad are present, then efforts to restore and to enhance the spawning population should include monitoring fish passage at impediments, supplemental stocking and habitat protection.

The Atlantic States Marine Fisheries Commission Shad and River Herring Management Board has taken measures⁷ to protect the mixed stocks of American shad that range along the Atlantic coast. They include:

- 1.) A five-year phase-out of commercial fishing in coastal ocean waters, which ended on Dec. 31, 2004;
- 2.) Management of in-river commercial fisheries so that at least 30 percent of the spawning adults, for evaluated stocks, will be allowed to reach the spawning grounds. This percentage of spawning adult American shad will ensure adequate numbers of juvenile shad are produced to keep the population stable; and
- 3.) Imposition of a "10 fish or less" recreational limit on those states with no limit. New Jersey's Fish and Game Council chose to approve a "six fish" recreational creel limit on American shad. This is the same recreational limit adopted by New York and Pennsylvania, the other two states that border the Delaware River.

More Information

More information can be obtained from the NJDEP Division of Fish and Wildlife at www.state.nj.us/dep/fgw, from the Delaware Estuary Program at www.delep.org, and from the Delaware Riverkeeper at www.delawareriverkeeper.org. Extensive information about fish is available through Fishbase at www.fishbase.org/search.cfm. Information on the Shad Fest is available from the Lambertville Chamber of Commerce at www.lambertville.org.

References

- ¹ See www.fishbase.org/search.cfm.
- ² Miller, J and Lupine, A. 1996. Creel Survey of the Delaware River American Shad Recreational Fishery. Delaware River Shad Fishermen's Association.
- ³ See www.lambertville.org/main.php?cntr%40funqsrf
- ⁴ Delaware Estuary Program. 2002. State of the Delaware Estuary Report
- ⁵ Delaware Estuary Program. 2002. State of the Delaware Estuary Report
- ⁶ Boriek, Mark, 2004, NJDEP Division of Fish and Wildlife, personal communication.
- ⁷ See page 50 of Amendment 1 to the Interstate Fishery Management Plan for Shad & River Herring. April 1999, available by clicking "Managed Species" and then "Shad and River Herring" at www.asmf.org/